

THE SYSTEMATIC POSITION OF THE AMAZONIAN SPECIES OF *ALBIORIX* (PSEUDOSCORPIONES, IDEORONCIDAE)

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ABSTRACT. The new genus *Xorilbia* (Pseudoscorpiones, Ideoroncidae) is established for three species from the Amazon region previously included in the genus *Albiorix*: the type species *X. arboricola* (Mahnert), *X. gracilis* (Mahnert) and *X. lamellifer* (Mahnert). The new genus bears a peculiar structure on the arolium that is only found in a few other genera of Ideoroncidae. New locality records are presented for *X. gracilis* and *X. lamellifer*, including the first record of *X. gracilis* from Venezuela.

Keywords: Taxonomy, new genus, Neotropical, Brazil, Venezuela, *Xorilbia*

The South American ideoroncid fauna consists of 14 species in two genera. The genus *Ideoroncus* Balzan 1887 contains nine species from Brazil and Paraguay (Mahnert 1984, 2001), while five species attributed to the genus *Albiorix* Chamberlin 1930 are found in Brazil, Argentina and Chile (Mahnert 1979, 1984, 1985b). While examining the status of the various species attributed to the genus *Albiorix*, we have found that the three species from Amazonian Brazil attributed to the genus *Albiorix* differ considerably from other members of the genus, particularly in features of the arolium – the elongate, soft structure situated at the distal end of the pedal tarsus between the tarsal claws of all pseudoscorpions (Chamberlin 1931). In particular, the three Amazonian species of *Albiorix* possess a small hooked structure on the ventral surface of the arolium, first observed by Vachon (1958) for two species of *Negroroncus* Beier 1931, a feature that is lacking in species of *Albiorix*. Also, the arolium is much longer than the claws and deeply divided in all species of *Albiorix*, whereas the arolium is slightly shorter than the claws and at most only slightly divided in the Amazonian species. These features suggested to us that the Amazonian species are misplaced in *Albiorix*, and we here transfer them to a new genus *Xorilbia* which is described and compared with similar ideoroncid genera.

The specimens mentioned in this paper are lodged in the following institutions: California

Academy of Sciences, San Francisco (CAS); and the University of California, Davis, California, U.S.A. (UCD). Comparative material of other ideoroncid taxa examined for this study is lodged in the Muséum d'histoire naturelle, Genève, Switzerland (MHNG); and the Western Australian Museum, Perth, Western Australia (WAM). Morphological terminology mostly follows Chamberlin (1931) and Harvey (1992).

The specimens were studied using one of two techniques. Temporary slide mounts were prepared by immersion of specimens in concentrated lactic acid at room temperature for several days, and mounting them on microscope slides with 10 or 12 mm coverslips supported by small sections of 0.25, 0.35 or 0.50 mm diameter nylon fishing line. After study, the specimens were returned to 75% ethanol. Permanent slide mounts were prepared by removing the pedipalps, the chelicera, left leg I and left leg IV from specimens with the use of eye-scissors or small needles, and clearing overnight with 10% potassium hydroxide at room temperature. The specimens were then washed in several rinses of water and 5% acetic acid (to neutralize the potassium hydroxide), and dehydrated through a graded ethanol series. They were then transferred to Euparal essence overnight at room temperature, prior to mounting in Euparal on microscope slides using 10 or 12 mm coverslips supported by small sections of 0.25, 0.35 or 0.50 mm diameter nylon fishing line. All specimens were

studied using an Olympus BH-2 compound microscope and illustrated with the aid of a drawing tube. Measurements were taken at the highest possible magnification using an ocular graticule. After study the specimens were returned to 75% ethanol with the dissected portions placed in 12 × 3 mm glass genitalia microvials (BioQuip Products, Inc.).

Family Ideoroncidae Chamberlin 1930

Genus *Xorilbia*

NEW GENUS

Type species.—*Ideoroncus arboricola* Mahnert 1979.

Etymology.—The generic name is an anagram of *Albiorix* and is to be treated as feminine.

Diagnosis.—Members of *Xorilbia* possess a small hooked process on the ventral surface of each arolium (Fig. 1), a feature shared with *Dhanus siamensis* (With 1906) and with all species of *Typhloroncus* Muchmore 1979, *Negroroncus* Beier 1931 and *Afroroncus* Mahnert 1981. It differs from these genera as follows: *Xorilbia* and *Typhloroncus* have a chelal trichobothrial pattern of 22 on the fixed finger and 10, occasionally 11, on the movable finger (22/10 or 22/11), whereas *Dhanus siamensis*, *Negroroncus* species and *Afroroncus* species have a pattern of 20/10, with the exception of *N. jeanneli* Vachon 1958, which has a pattern of 26/12. *Xorilbia* has chelal teeth that are widely spaced whereas *Typhloroncus* has closely-spaced chelal teeth. *Xorilbia* has 5 trichobothria in the *ib* region and 6 trichobothria in the *ist* region of the fixed chelal finger, whereas species of *Typhloroncus* bear 4 trichobothria in the *ib* region and 7 trichobothria in the *ist* region. *Xorilbia* also differs from *Typhloroncus* in the presence of one pair of eyes; whereas eyes are totally absent in all species of *Typhloroncus*.

Description.—All setae long, virtually straight and acicular. Most cuticular surfaces smooth and glossy.

Pedipalps: long and slender. Fixed chelal finger with 22 trichobothria, movable chelal finger with 10 trichobothria: *eb* region with 1 trichobothrium; *est* region with 6 trichobothria; *ib* region with 5 trichobothria; *ist* region with 6 trichobothria; *b* region with 2 trichobothria; and *t* region with 6 trichobothria; *st* not ventrally displaced. Venom apparatus present in both chelal fingers, venom duct ter-



Fig. 1.—*Xorilbia lamellifer* (Mahnert): detail of tip of left tarsus IV, female from Fazenda Esteio, Brazil. The arrow indicates the ventral hooked process on the arolium.

minating in nodus ramosus near *est* region in fixed finger and near *t* region in movable finger. Chelal teeth widely spaced. Condyle on the chelal hand small and rounded.

Chelicera: with 6 long, acuminate setae on hand; movable finger with 1 long subdistal seta; flagellum of 4 thickened blades, all blades serrate; lamina exterior absent; galea long and slender.

Cephalothorax: carapace with 2 small, bulging eyes; without furrows; anterior margin with 4 setae. Manducatory process with 2 long distal setae.

Abdomen: tergites and sternites undivided. Pleural membrane longitudinally striate. Each stigmatic sclerite with 1 seta. Posterior maxillary lyrifissure present and sub-basally situated. Spiracles simple, with spiracular helix.

Legs: femur I and II without basal swelling; femora I and II with primary slit sensillum directed transversely; femur I much longer than patella I; suture line between femur IV and patella IV transverse; metatarsus shorter than tarsus; metatarsal pseudotactile seta subproximal; legs with two subterminal tarsal setae, each acuminate; arolium shorter than claws, slightly divided, with ventral hooked process; claws slender and simple.

Remarks.—The hooked process on the ventral surface of the arolium of all legs (Fig. 1) was first noted and illustrated in two species of *Negroroncus* (Vachon 1958), and we have found that it is present in *Dhanus siamensis* and in species of *Typhloroncus*, *Negroroncus*, *Afroroncus* and *Xorilbia*. It would seem likely that the hooked process is an apomorphic feature that defines this group as a monophyletic entity, but the close relationship between *Afroroncus*, which bears a ventral hook, and *Nannoroncus* Beier 1955 (Mahnert 1981), which lacks a hook, may negate the power of this feature to define a clade. The process is absent from species of *Ideoroncus*, *Dhanus* Chamberlin 1930 (excluding *D. siamensis*), *Shravana* Chamberlin 1930, *Nhatrangia* Redikorzev 1938, *Nannoroncus*, *Albiorix* and *Pseudalbiorix* Harvey, Barba, Muchmore & Perez in press. *Dhanus siamensis* bears very little resemblance to the remaining species of *Dhanus*, including the type species *D. sumatranus*, and will be placed in a new genus as part of a forthcoming review of the Asian members of the Ideoroncidae (Harvey unpub. data).

The ideoroncids with a ventral hooked process on the arolium are widely distributed around the world with *Xorilbia* occurring in the Amazon basin in northern Brazil and southern Venezuela, *Typhloroncus* species from the West Indies and Mexico (Muchmore 1979, 1982, 1986), *Negroroncus* and *Afroroncus* from eastern Africa (Mahnert 1981), and *D. siamensis* from south-east Asia (Schawaller 1994).

The removal of the Amazonian species from *Albiorix*, and the recent transfer of two species of *Albiorix* to a separate genus (Harvey et al. in press) reduces *Albiorix* to 11 species ranging from western North America to Mexico [*A. anophthalmus* Muchmore 1999, *A. edentatus* Chamberlin 1930, *A. bolivari* Beier 1963, *A. conodontatus* Hoff 1945, *A. magnus* Hoff 1945, *A. mexicanus* (Banks 1898), *A. mirabilis* Muchmore 1982, *A. parvidentatus*

Chamberlin 1930, *A. retrodentatus* Hoff 1945], with isolated species in Argentina [*A. argentinensis* (Hoff 1954)] and Chile [*A. chilensis* (Ellingsen 1905)].

Distribution.—Species of *Xorilbia* occur in the northern Brazilian states of Amazonas and Pará, and in southern Venezuela.

Xorilbia arboricola (Mahnert 1979)

NEW COMBINATION

Ideoroncus arboricola Mahnert 1979:753–755, figs. 70–74; Adis et al. 1987:488.

Albiorix arboricola (Mahnert): Mahnert 1984:672–673; Mahnert 1985a:78; Mahnert & Adis 1986:213; Mahnert et al. 1986: fig. 10; Harvey 1991:316; Adis & Mahnert 1993: fig. 5; Mahnert & Adis 2002:379, fig. 10; Adis et al. 2002:5.

Diagnosis.—*Xorilbia arboricola* lacks the lamelliform ridge on the fixed chelal finger that is characteristic of *X. lamellifer*, and the pedipalpal segments are more robust than in *X. gracilis*.

Description.—See Mahnert (1979, 1984).

Remarks.—*Xorilbia arboricola* occurs at several locations in Amazonas and Pará where it is occasionally sympatric with *X. gracilis* (Mahnert 1984).

Xorilbia gracilis (Mahnert 1985)

NEW COMBINATION

Albiorix aff. *arboricola* (Mahnert): Mahnert 1984:673.

Albiorix gracilis Mahnert 1985b:223–224, figs. 27–28; Mahnert & Adis 1986:213; Harvey 1991:317. *Albiorix gracilis* Mahnert: Adis & Mahnert 1990:13, figs. 2–3; Adis & Mahnert 1993:435, figs. 2–3, 5; Mahnert & Adis 2002:379; Adis et al. 2002:5.

New material examined.—VENEZUELA: Amazonas: 1 ♂, 1 ♀, Alto Rio Siapa, 1°40'N, 64°35'W, 650 m, 4 February 1989, sifting leaf litter in rainforest, J. Latke (CAS).

Diagnosis.—*Xorilbia gracilis* lacks the lamelliform ridge on the fixed chelal finger that is characteristic of *X. lamellifer*, and the pedipalpal segments are more slender than in *X. arboricola*.

Description.—See Mahnert (1985b).

Remarks.—*Xorilbia gracilis* was recorded by Mahnert (1985b) from two locations in Amazonas where it is sympatric with *X. arboricola*. The new records listed here are of two further specimens from southern Venezuela that generally fit the original description, although they are slightly larger than the type specimens; e.g., chela (with pedicel) length,

male 1.067/0.245 (= 4.36 times longer than broad) and female 1.200/0.324 (= 3.70 times longer than broad).

Xorilbia lamellifer (Mahnert 1985)

NEW COMBINATION

Fig. 1

Albiorix lamellifer Mahnert 1985b:225–226, figs. 29–31; Mahnert & Adis 1986:213; Harvey 1991: 317; Mahnert & Adis 2002:379.

New material examined.—BRAZIL: *Amazonas*: 1 ♀, Fazenda Esteio, 80 km NNE. of Manaus, 2°25'S, 59°46'W, 80 m, 15 September 1987 (UCD).

Diagnosis.—The basal teeth on the fixed chelal finger of *X. lamellifer* are modified into a lamelliform ridge, which distinguishes this species from *X. arboricola* and *X. gracilis*.

Description.—See Mahnert (1985b).

Remarks.—Mahnert (1985b) described this species based upon a single female collected 25 km NE. of Manaus. We have examined a second female from a farm situated 80 km NNE. of Manaus.

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LITERATURE CITED

- Adis, J., A.B. Bonaldo, A.D. Brescovit, R. Bertani, J.C. Cokendolpher, B. Condé, A.B. Kury, W.R. Lourenço, V. Mahnert, R. Pinto-da-Rocha, N.I. Platnick, J.R. Reddell, C.A. Rheims, L.S. Rocha, J.M. Rowland, P. Weygoldt & S. Woas. 2002. Arachnida at 'Reserva Ducke', central Amazonia/Brazil. *Amazoniana* 17:1–14.
- Adis, J., W.J. Junk & N.D. Penny. 1987. Material zoológico depositado nas coleções sistemáticas de entomologia do INPA, resultante do "Projeto INPA/Max-Planck". *Acta Amazonica* 15:481–504.
- Adis, J. & V. Mahnert. 1990. Vertical distribution and abundance of pseudoscorpion species (Arachnida) in the soil of a neotropical secondary forest during the dry and the rainy season. *Acta Zoologica Fennica* 190:11–16.
- Adis, J. & V. Mahnert. 1993. Vertical distribution and abundance of pseudoscorpions (Arachnida) in the soil of two different neotropical primary forests during the dry and rainy seasons. *Memoirs of the Queensland Museum* 33:431–440.
- Chamberlin, J.C. 1931. The arachnid order Chelonethida. Stanford University Publications, Biological Sciences 7(1):1–284.
- Harvey, M.S. 1991. Catalogue of the Pseudoscorpionida. Manchester University Press, Manchester.
- Harvey, M.S. 1992. The phylogeny and systematics of the Pseudoscorpionida (Chelicerata: Arachnida). *Invertebrate Taxonomy* 6:1373–1435.
- Mahnert, V. 1979. Pseudoscorpione (Arachnida) aus dem Amazonas-Gebiet (Brasilien). *Revue Suisse de Zoologie* 86:719–810.
- Mahnert, V. 1981. Die Pseudoscorpione (Arachnida) Kenyas. I. Neobisiidae und Ideoroncidae. *Revue Suisse de Zoologie* 88:535–559.
- Mahnert, V. 1984. Beitrag zu einer besseren Kenntnis der Ideoroncidae (Arachnida: Pseudoscorpiones), mit Beschreibung von sechs neuen Arten. *Revue Suisse de Zoologie* 91:651–686.
- Mahnert, V. 1985a. Pseudoscorpions (Arachnida) from the lower Amazon region. *Revista Brasileira de Entomologia* 29:75–80.
- Mahnert, V. 1985b. Weitere Pseudoscorpione (Arachnida) aus dem zentralen Amazonasgebiet (Brasilien). *Amazoniana* 9:215–241.
- Mahnert, V. 2001. Cave-dwelling pseudoscorpions (Arachnida, Pseudoscorpiones) from Brazil. *Revue Suisse de Zoologie* 108:95–148.
- Mahnert, V. & J. Adis. 1986. On the occurrence and habitat of Pseudoscorpiones (Arachnida) from Amazonian forest of Brazil. *Studies on Neotropical Fauna and Environment* 20:211–215.
- Mahnert, V. & J. Adis. 2002. Pseudoscorpiones. Pp. 367–380. *In* Amazonian Arachnida and Myriapoda. (J. Adis, ed.). Pensoft Publishers, Sofia.
- Mahnert, V., J. Adis & P.F. Bührnheim. 1986. Key to the families of Amazonian Pseudoscorpiones (Arachnida). *Amazoniana* 10:21–40.
- Muchmore, W.B. 1979. Pseudoscorpions from Florida and the Caribbean area. 9. *Typhloroncus*, a new genus from the Virgin Islands (Ideoroncidae). *Florida Entomologist* 62:317–320.
- Muchmore, W.B. 1982. Some new species of pseudoscorpions from caves in Mexico (Arachnida, Pseudoscorpionida). *Bulletin for the Association of Mexican Cave Studies* 8:63–78.
- Muchmore, W.B. 1986. Additional pseudoscorpions, mostly from caves, in Mexico and Texas (Arachnida: Pseudoscorpionida). *Texas Memorial Museum, Speleological Monographs* 1:17–30.
- Schawaller, W. 1994. Pseudoscorpione aus Thailand (Arachnida: Pseudoscorpiones). *Revue Suisse de Zoologie* 101:725–759.
- Vachon, M. 1958. Sur deux Pseudoscorpions nouveaux des cavernes de l'Afrique équatoriale [Ideoroncidae]. *Notes Biospéologiques* 13:57–66.

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